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INSECTS IN RELATION
TO
NATIONAL DEFENSE

Circular 16

HORSE BOTS



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INTRODUCTION

Horse bots have much to do with the efficiency of horses and mules. Injury from the effects of the bots in the digestive tract is seldom evident in very light infestations. On the other hand sore mouths, emaciation, colic, and even death from stoppage of the digestive tract may result from heavy infestations. More feed is required to keep an infested work animal in condition. The bot flies when laying eggs seriously annoy horses and mules, whether grazing, on picket lines, or in harness. Animals

may be kept from grazing the greater part of the daylight hours and those in harness are difficult to handle and may become unmanageable, especially if nose flies are present in numbers.

KINDS AND HOW TO DISTINGUISH THEM

There are three species of horse bots commonly found in the United States. Their appearance and habits differ considerably.

The common horse bot fly, Gastrophilus intestinalis De Geer, Fig. 1, is



Figure 1 - The common horse bot fly.

the largest of the three species, about 7/8 of an inch long and nearly black, and it is well covered with bands of black and yellowish hair. It is readily separated from the other species by the cloudy spots on the wings.

The nose fly, G. haemorrhoidalis L., Fig. 2, is the smallest of these species. The wings are clear. It is nearly black in color, with some yellow hair on the thorax and at the base of the abdomen and orange-colored hair at the tip of the abdomen. The throat bot fly, G. nasalis (L.), has clear wings also, but the color is lighter and it doesn't have the orange hair at the tip of the abdomen.

The three species have distinctive egg-laying habits. The common bot fly hovers leisurely around the legs of a horse, laying egg after egg. The flight of the nose fly is very fast. It usually poises a moment in front of the forelegs, then darts at the lips and quickly flies away to repeat the action in a few seconds. The throat bot has a somewhat similar but slower flight and it is more inclined to stay close to the host and repeat its darting flight to attach egg after egg beneath the jaws.



Figure 2 - The nose bot fly.

The eggs of the three species are readily distinguished as shown in Fig. 3. The egg of the common bot fly is yellowish and is attached for about $\frac{1}{3}$ its length to the hair, and often from 2 to 10 eggs are found attached to a single hair. The eggs are found chiefly on the forelegs, shoulders, neck, and flanks. The throat bot fly egg is also yellowish; it is attached, however, to the hair by more than half its length. It is usually attached close to the skin under the jaw.

The nose fly egg is nearly black in color and has a long roughened basal clamp with which it is attached close to the skin on the short hair of the lips.

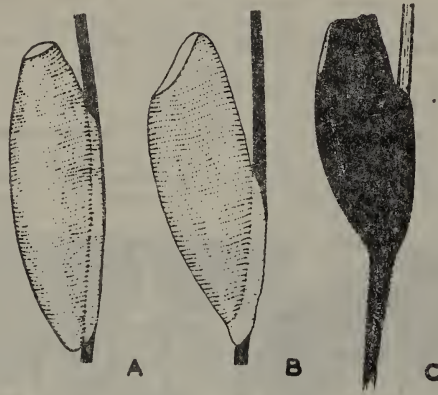


Figure 3 - Eggs of horse bot flies.

A. throat bot fly; B. common horse bot fly; C. nose bot fly.

The larvae, or bots, of the three species are rather easily distinguished in either the first or last stages, Figs. 4 and 5. The common horse bot, when full-grown, is about $\frac{7}{8}$ of an inch long. It is yellowish with a distinct pink cast and is usually found in the left sac of the stomach. The nose bot is slightly smaller and is found in the right as well as the left sac of the stomach and to some extent in the duodenum.

Before leaving the host it attaches in the rectum and is often seen protruding from the anus. It is pinkish in color, becoming greenish before passing out of the host.

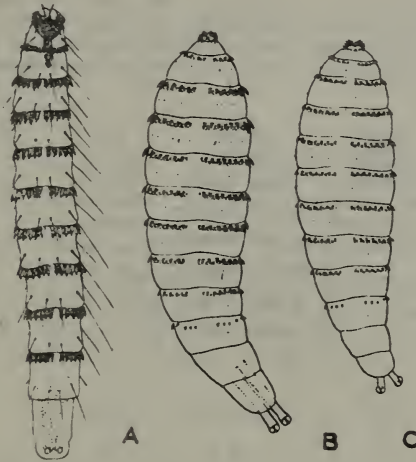


Figure 4 - Horse bot larvae (first stage).

A. throat bot fly; B. common horse bot fly; C. nose bot fly.

The throat bots are whiter than the other two species and are found mainly in the duodenum. Those of small size are also found occasionally attached in the pharynx.

DISTRIBUTION

The common horse bot and the throat bot are widely distributed in the United States. The latter species is especially abundant in the Rocky Mountain region. The nose bot is present only in the region from the Cascade range in Washington eastward to Lake Michigan, and southward from the southern provinces of Canada to northern Utah, Colorado, and Kansas.

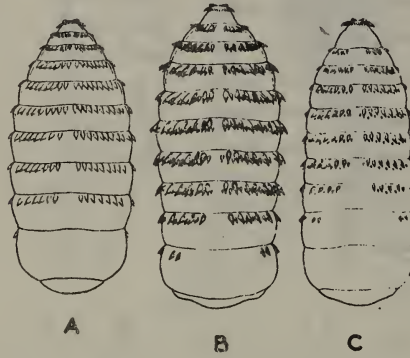


Figure 5 - Horse bot larvae (last stage).

A. throat bot fly; B. common horse bot fly; C. nose bot fly.

HOW INJURY IS PRODUCED

Severe annoyance is caused by the bot flies at the time they are laying eggs. This is particularly true of the nose fly. The

livestock often keep grouped and fight the flies vigorously much of the day rather than graze. The attack of the nose fly often so excites horses in harness as to cause them to run away, resulting in injury to the animals and destruction of property.

The newly hatched larvae of all three species burrow about in the mucous membranes of the mouth for about 30 days causing soreness which may interfere with eating. The presence of throat bots in the pharynx has been known to cause such severe swelling as to prevent swallowing and occasionally produce strangulation. The attachment of bots in the stomach and duodenum causes severe lesions on the lining of those organs. Heavy infestations have been known to cause stoppage at the exit (pyloric) end of the stomach. Colic is frequently associated with bot infestation and the general condition of heavily infested animals is lowered. Considerable irritation of the tissues is also produced by the attachment of nose bots in the rectum.

LIFE HISTORY AND SEASONAL ACTIVITY

The three species of bots have somewhat similar life cycles but they differ in certain respects.

The flies usually make their appearance about the middle of June in the Central States, earlier in the South, and later in the North. They are more or less active throughout the summer and nearly always become most numerous in the fall before heavy freezes stop their activity. The adults do not feed; in fact, their mouth parts do not function. Their life span is short--

usually being only 2 to 6 days---and they are ready to lay eggs soon after they emerge and mate.

As previously stated, the eggs of each species are laid on fairly distinct regions of the host. The eggs of the common horse bot fly are ready to hatch in about 7 days, but the larvae do not emerge until the eggs are warmed by the horse's lips. They may remain in the eggs, awaiting the hatching stimulus for as long as 3 months. The larvae, upon being taken into the mouth, penetrate the mucosa of the tongue and lips and burrow about in them for about 30 days, then pass into the stomach and attach there.

The throat bots hatch in about 5 days, and crawl along the jaw to the mouth. They are found mainly in the pockets between the molar teeth. Some attach in the pharynx on the way to the stomach.

The eggs of the nose fly hatch in 2 to 4 days and the larvae penetrate the skin of the lips at once and burrow in this tissue until the mucous lining of the lips is reached. Here they burrow about for more than a month before passing on into the stomach.

The period of attachment of the larvae of all three species in the stomach and intestines varies from 8 to 11 months. When full-grown the bots release their hold and pass out with the excrement, except in the case of the nose bot. This species reattaches in the rectum for a 1- to 3-day period before dropping to the ground.

When the bots reach the ground they seek protection under debris or by burrowing slightly

into the soil, and soon pupate.

The pupal stage, Fig. 6, lasts from 20 to 70 days; this period being about the same for each of the three species.



Figure 6 - Pupa, or resting stage, of a bot fly.

CONTROL

Horse bots attack only horses, mules, and asses and they are all found in the digestive tract for the major part of each year. As the bot flies do not feed, no effective method of baiting or trapping them has been found. Partial and temporary relief may be given by catching the flies with a net as they oviposit, or by knocking them down and destroying them. Such efforts, and also steps to destroy the eggs during the active bot fly season are impractical.

Protective Devices

In areas where nose flies are abundant it is necessary to protect the lips of horses in harness or saddle. A piece of leather or belting 4 to 6 inches wide and long enough to cover the entire lips, suspended beneath the mouth from the bit rings, will protect the animal from attack and allay its excitement. A piece of canvas or burlap suspended beneath the jaws from the throat latch to the bit rings gives a high degree of protection from the throat bot fly.

Destruction of Bot Fly Eggs

Efforts to control bots or prevent infestation of animals by treating the bot eggs are impractical. Some reduction in the number of bots infesting an animal may be brought about by clipping the hair that is infested with eggs. The application of materials such as kerosene and creosote dips has little effect on the eggs. However, the application of warm water (105 to 110° F.) to the eggs of the common horse bot when the weather is cool will cause a high percentage of them to hatch. The young bots will soon die when thus artificially hatched. The water should be applied freely to the legs and body where the eggs occur with a sponge or cloth swab and rubbed vigorously.

This treatment is especially recommended in conjunction with the internal treatment of the animals with carbon disulphide. It should be remembered that the eggs are ready to hatch about 7 days after being laid and that the larvae may remain alive within the eggs for about 3 months if they are not stimulated to hatch by the contact of the horse's lips or by the method mentioned above.

To bring about the best results in bot control the destruction of the eggs of the common bot should be accomplished soon after the bot flies have been killed by freezing weather in the fall.

Treatment of Horses and Mules for the Destruction of Bots

A high percentage of the bots in stomach and duodenum can be destroyed by administering carbon disulphide by mouth. The bots are killed

by the drug in solution and as a gas. The treatment also destroys most of the large intestinal round worms.

This treatment is best given as early in the winter as practicable, but it can be carried out with a high degree of success any time from December 1 to February 15.

A period of about 30 days should elapse from the cessation of bot fly activity and the application of hot water to the eggs before the carbon disulphide is administered. This allows time for the small bots that may be in the tissues of the mouth to pass into the stomach where they can be reached by the medication.

Carbon disulphide in liquid form is given in gelatine capsules or in a masked capsule (absorbed on a neutral carrier and this powder enclosed in a capsule). Another approved method is through a stomach tube which insures getting the material into the stomach.

The treatment recommended by the Bureau of Animal Industry is as follows:

"Fast the animal from noon of the day preceding treatment until 6 or 7 o'clock of the next morning. At this time the animal is given carbon disulphide in gelatine capsules, the capsules being given by hand or by means of a balling gun. The dose for a horse weighing about 1000 pounds is 1 dose of 6 drams, or 2 doses of 4 drams each with a 2-hour interval between doses, or 3 doses of 3 drams each with a 1-hour interval between doses. Do not feed or water for 3 hours after treatment. As a rule the single-dose treatment is most satisfactory, but if there is any question as to the animal's ability to tolerate the dose, divided doses may be given and the treatment sus-

pendent if bad effects follow a partial treatment. The dose should be diminished for smaller animals, and yearling colts should not receive over half the quantities given above. Very old or weak horses, or those suffering from febrile or debilitating diseases are sometimes poor risks for treatment. The carbon disulphide should not be followed by a purgative, and oil is especially undesirable. Preliminary purgation the evening before treatment is advisable only in the case of a constipated animal. The bots may continue to pass out for over two weeks after treatment.

"In view of the fact that carbon disulphide is a poison, intended to poison the bots, and one which may cause unpleasant results or even death if given unskillfully or administered to animals having disease conditions which make the treatment unsafe, it is always advisable to have the treatment given by a competent veterinarian whenever possible. Serious consequences have resulted when poorly trained men used make-shift balling guns. When a capsule breaks in a horse's mouth and the carbon disulphide gets into the lungs, the horse may die."

The treatment of all horses, mules, and donkeys in a given area is urged. This results in a great reduction in bot fly annoyance the following summer as well as in an immediate improvement of the treated animals. All colts dropped before the bot flies were killed by cold weather are likely to be infested and should be treated.

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